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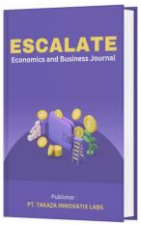

Improving User Engagement of the Livin Mandiri Application: An Analysis of the Role of Gamification and User Experience with User Satisfaction as a Mediator

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Abstract: *The rapid advancement of digital banking services has led financial institutions to strengthen user interaction through user experience and gamification strategies. This study aims to analyze the effect of user experience and gamification on user engagement in the Livin by Mandiri application, with user satisfaction as a mediating variable. This quantitative study used primary data collected through online questionnaires distributed to 234 users in the Jakarta area. Data were analyzed using the Partial Least Squares-Structural Equation Modeling (PLS-SEM) method with SmartPLS 4 software. The results show that both user experience and gamification significantly influence user satisfaction, while user satisfaction positively affects user engagement. However, user experience and gamification do not directly influence engagement. The study concludes that user satisfaction serves as a crucial mediating factor linking system design and motivational features to sustainable engagement in digital banking services.*

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Introduction

Digital transformation in the banking industry has driven a significant shift from conventional services to digital application-based services. This development requires banks to not only provide comprehensive transaction features but also deliver a superior user experience to meet increasingly technology-adaptive customer expectations. In this context, the quality of the user experience is a crucial factor in building perceived value, satisfaction, and continued use of digital banking applications (Indrianti & Kurniawan, 2023; Bayode & Ruzhanskaya, 2024). The increasingly fierce competition among mobile banking applications

in Indonesia demands continuous user-centric innovation as a key differentiation strategy.

This competitive phenomenon is evident in the national digital banking app market, where several major banks are competing to provide technology-based services with intuitive interfaces and increasingly personalized features. Although Livin by Mandiri has shown significant user growth, its position remains below several major competitors. This situation indicates that successful app adoption is not solely determined by institutional strength or the amount of funds under management, but also by the app's ability to create sustained user engagement through satisfying and interactive digital experiences (Prasetyaningrum et al., 2024; Smirani & Yamani, 2024).

The main issue that arises in this context is the low level of long-term user engagement, despite positive perceptions of the app's basic functionality. Several studies have shown that a good user experience does not necessarily directly drive user engagement if it is not accompanied by psychological and emotional satisfaction (Nova & Fitria, 2023; Yuniati et al., 2024). This indicates a gap between an app's functional quality and sustained user engagement.

Furthermore, the implementation of gamification as a strategy to increase user engagement in digital banking applications still produces mixed results. Gamification has been shown to increase user motivation and satisfaction in the short term, but does not always directly impact long-term user engagement (Anugrah et al., 2021; Wardani & Herman, 2025). This situation raises questions about the psychological mechanisms that bridge the relationship between gamification and user engagement, particularly in the context of digital financial services.

Another issue lies in the lack of user awareness of the gamification features available in the Livin by Mandiri app, such as Livin Points, which have not been optimally utilized. This low awareness has the potential to hinder the effectiveness of gamification strategies in increasing user satisfaction and engagement. Previous research has shown that without gamification design integrated with user needs, these features tend to be perceived as less valuable add-ons (Putri & Karim, 2020; Prasetyaningrum et al., 2024).

Based on these phenomena and problems, this study aims to analyze the influence of user experience and gamification on user engagement with user satisfaction as a mediating variable in the Livin by Mandiri application. The urgency of this research lies in the need for the digital banking industry to understand the psychological factors that drive sustainable user engagement. The novelty of this study lies in testing the mediating role of user satisfaction in explaining the relationship between user experience, gamification, and user engagement empirically in the context of Indonesian digital banking applications, particularly Livin by Mandiri, which has been relatively limited in previous research.

Research Methods

Research Approach

The type of approach used by the researcher in conducting the related research is a

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quantitative approach which is presented in the form of numerical data and the data results can be analyzed to determine the final results that represent the existing data.

Place & Time of Research

1. Place

The research to be conducted by the researcher will be conducted online with the target respondents being residents of the DKI Jakarta area, including but not limited to East Jakarta, West Jakarta, Central Jakarta, South Jakarta, and the Seribu Islands. The selection of this research location is based on the fact that the majority of respondents in the initial questionnaire survey are aged between 17 and 30 years and reside or are domiciled in the DKI Jakarta area. Based on the results of the researcher's previous research, it is known that the majority of respondents are aware of the gamification features in the Livin Mandiri application and are aware of the benefits of the user experience.

2. Research Time

This research process was carried out for two weeks in June to July 2025. This time selection was based on the development and completion schedule for the final work in the even semester of the 2024/2025 academic calendar at Jakarta State University.

Population & Sample

1. Population

In the context of the research population that the researcher will carry out, the researcher targets the community in the geographical area of DKI Jakarta, Bogor, Depok, Tangerang, and Bekasi (Jabodetabek) as the population of the research that will be carried out by the researcher due to its suitability with the needs and objectives of the research that will be carried out.

2. Sample

Based on the research plan that the researcher wants to carry out and considering various other aspects such as limited access to material and immaterial, this research is planned to use the following types:*sampling*that is*non-probability sampling*Due to the total population coverage which cannot be determined with certainty, this is due to the number of Livin Mandiri application users which will certainly increase over time.

Researchers plan to use the rules*general rule*from Joseph Hair with a minimum of 5 to 20 respondents per indicator, where the researcher has a total of up to 39 indicators to be used in the study so that the possible number of respondents that will be obtained by the researcher is at least 190 respondents to 760 respondents, then the researcher estimates a total of 234 respondents from the calculation of 6 respondents per indicator, or 234 research respondents. According to Joseph Hair,*general standard*The ratio between observations and independent variables should not be below 5:1 or a minimum of five observations for each independent variable. However, it is recommended to have a range of between 5 and 20 respondents per independent variable, but a minimum of 50 respondents is required for the study. However, a number of respondents above 200 is considered capable of providing much better information.

Data collection technique

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The data used in this research is primary data, where according to Primary data is data that directly provides the data collector with the necessary information. Primary data is obtained directly through the distribution of digital questionnaires via social media channels. This research is associative, or studies the relationship between one variable and another.

Data Analysis Techniques

Researchers conducted a series of tests using the method*Partial Least Square Structural Equation Modeling*(PLS-SEM) with*software*SmartPLS version 4.0. The selection of the PLS-SEM method compared to CB-SEM is based on the researcher's research objectives in exploring the relationship between research variables where the researcher uses fairly new instruments as well as a combination of two different instruments.

Results and Discussion

The testing process by performing analysis*outer model*And*inner model*by using*SmartPLS 4.0 software*with the PLS-SEM measurement technique. The analysis results are as follows.

Outer Model Analysis

*Outer model*or also known as a measurement model/*measurement model*is a model for measuring the relationship between indicator items and variables from a research path. Analysis of*outer model*able to start by checking the convergent validity testby checking the outer loading and AVE values from the related questionnaire data. The adjusted outer loading and AVE data are as follows.

Table 1. Loading Factor and AVE Table

Variables	Indicator	*Outer Loading*	AVE
User Experience (UX)	MO1	0.725	0.571
	MO2	0.673	
	MO3	0.770	
	AC1	0.793	
	AC2	0.799	
	AC3	0.722	
	US1	0.699	
	US2	0.812	
	US3	0.797	
Gamification	AP1	0.878	0.734
	AP2	0.885	
	AP3	0.849	
	CH1	0.857	
	CH2	0.878	
	CH3	0.882	
	CO1	0.845	
	CO2	0.841	
	CO3	0.841	
	PL1	0.843	
	PL2	0.874	
	PL3	0.806	
User	AA1	0.709	0.527

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Variables	**Indicator**	***Outer Loading***	**AVE**
Engagement	AA2	0.684	
	AA3	0.685	
	FA1	0.760	
	FA2	0.761	
	FA3	0.748	
	FI1	0.732	
	FI2	0.736	
	FI3	0.715	
User Satisfaction	FU1	0.718	0.527
	FU2	0.724	
	FU3	0.739	
	PR1	0.746	
	PR2	0.768	
	PR3	0.742	
	SA1	0.684	
	SA2	0.669	
	SA3	0.740	

When conducting validity tests, understanding the AVE and outer loading values is crucial. An acceptable outer loading value is above 0.6. Based on the convergent validity test results in Table 1, all indicator results are above 0.6, the lowest threshold for a valid indicator item. Validity is a benchmark by which an indicator item is assessed as having successfully explained a research variable being studied. Therefore, it can be concluded that each related indicator item is able to explain each variable being studied, including user experience, gamification, user satisfaction, and user engagement.

Understanding convergent validity across variables can be achieved by understanding how the AVE value from the related analysis must be above 0.5, the lowest threshold for validity in the related variables. The validity of the AVE value is a benchmark for understanding whether more than half or all of the indicator items have been assessed as being able to explain the related variables or not. Based on Table 1, all variables have AVE values above 0.50, or more than 50% of the indicator items from the user experience, gamification, user satisfaction, and user engagement variables. Furthermore, the user experience, user satisfaction, and user engagement variables show good AVE values, although only slightly above the threshold, which is around 52% to 57%. Meanwhile, the gamification variable shows much better results with a value of 0.734, or around 73.4% of the indicator items have been able to explain the variable, which indicates a very high level of indicator cohesiveness.

Based on the results of the outer loading and AVE, it can be concluded that each indicator item used in the study was valid in explaining the research variables. The gamification variable was deemed the most valid indicator, while the user experience, user satisfaction, and user engagement variables were found to be quite valid, although not as strong as the gamification variable.

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To understand how an indicator item is assessed for its consistency and usefulness in measuring research variables, researchers can use reliability tests. Two assessments can be used to understand the level of reliability of data: construct reliability and Cronbach's alpha. However, in the research process using PLS-SEM, utilizing construct reliability is more recommended because construct reliability will adjust the results of a variable's reliability value based on the strength of its loading indicator results. Where a value that tends to be larger will have a greater impact on reliability results compared to a smaller value, while Cronbach's alpha assumes all loading indicator values will be evenly distributed, thus impacting the resulting level of reliability. An acceptable composite reliability value in a study is more than 0.70. However, in exploratory research, a value between 0.60 and 0.70 is still acceptable. The composite reliability values of the related data are as follows.

Table 2. Composite Reliability Table

Variables	***Composite Reliability***
User Experience	0.923
Gamification	0.971
User Satisfaction	0.909
User Engagement	0.909

Based on Table 2, it is known that the composite reliability value for each variable is above 0.70, which means it is sufficiently acceptable in the related research data. Reliability is a benchmark for understanding whether an indicator item is consistent in measuring a research variable. Based on Table 2, it is known that all variables have indicator items that have achieved the expected level of reliability, so each variable is consistent in measuring the research variables it measures.

The conclusion from the outer model testing results shows that the indicator items used by the researchers have been deemed valid in explaining each studied variable based on convergent validity testing using outer loading and AVE. Furthermore, each related indicator item consistently measures the studied variable based on composite reliability testing. Based on both related tests, the gamification variable indicator items are deemed to have significantly better results than the other variables.

Inner Model Analysis

*Inner model*or commonly known as a structural model is a model formeasuring the relationship between a variable and other related variables in a research path. In understanding the inner model, the first thing that can be done is to conduct an R-Square test. The R2 test will help in understanding the level of explanation of the variables related to other variables. If the R2 increases, then the explanation of the related variables towards other variables will be higher. When the R2 value of a variable is above the specified threshold, then each variable is considered capable of explaining the variables that influence it. The threshold for understanding the standardization of R2 is with a value of 0.25 as the lowest value, 0.50 as a moderate value, and 0.75 as a high value. The R2 values from related research are as follows.

Table 3. R-Squared Table

Variables	***R-Square***	***R-Square Adjusted***
User Satisfaction	0.596	0.592
User Engagement	0.665	0.661

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Based on Table 3, it is known that the R2 value for the dependent variable is*user engagement*has a value of 0.596 and 0.592 for the version*adjusted*-nya, thus indicating that the variable*user experience, gamification,*and user satisfaction are able to explain the user engagement variable by 59% or is quite moderate, while the remaining 41% can be explained by other variables outside the related research. Meanwhile, for the mediating variable, namely user satisfaction, it has an R2 of 0.665 and its adjusted version is 0.661, showing that the user experience and gamification variables have a percentage of 66% or are quite moderate in explaining user satisfaction, while the remaining 34% can be explained by other variables outside the related research.

To deepen our understanding of how each of the studied variables is able to explain user satisfaction and user engagement, we can conduct an effect size analysis by understanding the F2 (effect size) value in comparing the impact of each pair of variables. When the F2 (effect size) value of a variable is above the specified threshold, then each pair of variables is considered capable of explaining the influence of the variable on the affected variable. The threshold in understanding the F2 standardization is with a value of 0.02 as the lowest minimum, 0.15 as a medium minimum, and 0.35 as a high minimum. If the value is below 0.02, it is certain that there is no effect from F2 at all. The F2 values from related research are as follows.

Table 4. F-Square Table (Effect Size)

	User Engagement	User Satisfaction
Gamification	0.016	0.069
User Engagement		
User Experience	0.034	0.826
User Satisfaction	0.485	

Based on Table 4, it is known that that each variable*user experience*And*gamification*with*user engagement*have quite low values, each with a value of 0.034 and 0.016. However, both are still able to explain the variable*user engagement*although it tends not to be large.The largest variable in explaining*user engagement*is a variable*user satisfaction*by 48%. Meanwhile, in explaining the variables*user satisfaction,*variables*gamification*only able to contribute 0.069 or 6.9% in explaining*user satisfaction.*Whereas*user experience*contributed the largest percentage of up to 0.826 or 82.6%.

These results show that the use of mediating variables such as user satisfaction aspects is much more recommended in influencing the level of user involvement in using a product.*e-banking*like*Living by Mandiri.*This aligns with other research that argues that the use of gamification is necessary to help users satisfy their psychological needs, thereby increasing their interest in actively engaging with a product. Meanwhile, in the context of the variable*user experience,*based on data*effect size*noted that*user experience*does not have a big influence on the variables*user engagement*, but*user experience*has a fairly strong influence on*user satisfaction.*This is reinforced in other research which explains that the user

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experience is primarily in the aspect of how easily a product can be used (*usability*) is able to have an impact on the level of satisfaction in using an application product.

Hypothesis Testing

In conducting a direct analysis of the relationship between variables to understand whether a hypothesis is significant or not, researchers conduct tests using the test method.*bootstrapping*with*software*SmartPLS 4. Analysis*bootstrapping*is a technique*resampling*which takes big data from original data.

In understanding the test results*bootstrapping*,conduct analysis of the value*t-value*/*t-statistics*can be used to understand the level of significance of a research relationship, where if the significance value is above the critical value of*t-value*Therefore, the relationship between the related variables can be categorized as significant. Researchers used a standard significance level of 5%, which means there is a 5% risk that the conclusions of the related hypothesis do not match the reality in the field. The significance level of 5% in the value*t-statistics*of 1.96. In addition to using the value*t-statistics*, in understanding the level of significance of a hypothesis, it can be understood by checking the value*p-values*,where if the value*p-values*is below 0.05, the related variable can be said to be significant. The results of the direct research path analysis can be described as follows.

Table 5. Coefficient Path Analysis Table

	Original Sample (O)	*T statistics (|O/STDEV|)*	*P-values*	*Result*
H1: User Experience (UX) > User Satisfaction	0.661	13,718	0,000	Significant
H2: Gamification > User Satisfaction	0.190	3,863	0,000	Significant
H3: User Satisfaction > User Engagement	0.634	7,455	0,000	Significant
H4: Gamification > User Engagement	0.087	1,430	0.076	Not significant
H5: User Experience > User Engagement	0.165	1,468	0.071	Not significant

Based on Table 5, it is known that of the total of five hypotheses, the first three hypotheses show the results of the value*t-statistics*And*p-values*are in the significant category, while the fourth and fifth hypotheses have a significant value*t-statistics*below 1.96, so it can be concluded that there is a possibility of more than five percent or above the acceptable risk value in the possibility of related hypotheses having significant results that do not correspond to reality. Meanwhile, if we look at the value*p-values*it is known that the related value is above 0.05 so it can be concluded that the value*p-values*of the two related hypotheses, there is a risk that the conclusions will not correspond to reality of more than five percent.

The results of the fourth hypothesis which discusses the variables*gamification*has a significant and positive influence on*user engagement*can be assessed as wrong or unacceptable in accordance with other research which argues that gamification features do not always have a direct influence on*engagement*,especially if the research focus is on one

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specific element of gamification. Meanwhile, the fifth hypothesis discusses the variable*user experience*has a significant and positive influence on*user engagement*can be categorized as wrong or unacceptable. This can be caused by the experience of use that can be related to it*user engagement*when using attributes such as interest, aesthetics, challenge, control, motivation, novelty, and feedback to users compared to the dimensions used by researchers.

Discussion

Based on the results of the testing process that has been carried out previously in understanding*inner model, outer model,*and the hypothesis analysis that has been carried out, the researcher is able to summarize the results of the hypothesis which can be explained as follows.

The Relationship Between User Experience and User Satisfaction

Based on the results of the analysis of the test*t-statistics*And*p-value,*it is known that both related values are within a fairly significant range, where*t-statistics*has a value of 13.718 which is above the figure of 1.96 and*p-value*has a value of 0.00 which is below 0.05. In addition,*original sample*shows a positive value. The overall results of this assessment show that the first hypothesis which states that ""The influence of user experience has a positive impact on user satisfaction" is considered acceptable. This is in line with previous studies which show that there is a relationship between improving user experience when using a product or service and being able to increase user satisfaction with the related product or service.(Kamil, 2023);(Nova & Fitria, 2023).

In the context of e-banking case studies, user experience is a very important thing in increasing user satisfaction in using related products, where user convenience in using an e-banking product is something that is able to encourage competitive advantages so that it ultimately encourages increased profitability from the results of improving the user experience.(Bayode & Ruzhanskaya, 2024)This is supported by other research which argues that banking product customers will tend to use products that are simple, easy to use, and user-friendly because users will tend to feel happy when their expectations are met, thus improving the quality of service and functional quality perceived by users when using the related product.

The conclusion of this hypothesis shows that the Livin by Mandiri application has a fairly good level of user experience, making related aspects a competitive advantage in the current digital banking application market, in an effort to attract more users and drive future profitability growth. Furthermore, this good user experience occurs because the related banking application tends to be simple to use, easy to operate by almost all types of users, and is considered functional in meeting users' daily financial needs. These things encourage users to feel satisfied with the experience of using the Livin by Mandiri application product.

The Relationship Between Gamification and User Satisfaction

Based on the results of the analysis of the test*t-statistics*And*p-value,*it is known that both related values are within a fairly significant range, where*t-statistics*has a value of 3.863 which is above the figure of 1.96 and*p-value*has a value of 0.00 which is below 0.05. In

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addition,*original sample*shows a positive value. The overall results of this assessment show that the first hypothesis which states that ""The positive impact of gamification on user satisfaction" was found to be acceptable. This is in line with previous studies that showed a relationship between the use of gamification features such as the Points feature and the level of user satisfaction in using e-banking applications.(Bauer et al., 2020);(Putri & Karim, 2020).

In the context of e-banking case studies, the use of gamification features in e-banking products as part of innovation in digital banking products is considered capable of increasing the level of user satisfaction by focusing on meeting the psychological needs of users and encouraging user motivation in using related e-banking products.(Prasetyaningrum et al., 2024). Another study explains that the use of gamification features in banking application products will be able to increase user satisfaction when the gamification features are used well, making the experience of using banking application products more enjoyable and interesting, thus having an impact on increasing the level of user satisfaction with the related product.(Baptista & Oliveira, 2017).

The conclusion of this hypothesis shows that the gamification features in the Livin by Mandiri app have been deemed capable of fulfilling users' psychological needs, such as feelings of joy or happiness when using related features within the banking app. When users' psychological needs, such as feeling happy from using the gamification features, are met, they tend to feel satisfied with the features.

The Relationship Between User Satisfaction and User Engagement

Based on the results of the analysis of the test*t-statistics*And*p-value*,it is known that both related values are within a fairly significant range, where*t-statistics*has a value of 7.455 which is above the figure of 1.96 and*p-value*has a value of 0.00 which is below 0.05. In addition,*original sample*shows a positive value. The overall results of this assessment show that the first hypothesis which states that "The influence of user satisfaction has a positive impact on user satisfaction" is stated to be acceptable. This statement is in accordance with previous studies which explain that the level of user satisfaction from using the related application will encourage users to continue actively using the Livin by Mandiri e-banking application product continuously.(Nugroho, 2022) (Mohanty et al., 2022).

In the context of e-banking case studies, the development of aspects related to the quality of digital services such as user privacy, application UI/UX design, product reliability for use, and customer support is considered capable of increasing the level of user satisfaction, thus encouraging better use of related application products. In other studies, satisfaction with the use of an e-banking application product can encourage increased user engagement with related banking products due to the emergence of emotional attachments between users and the product, thus encouraging users to continue increasing their transactions in related applications.

The conclusion of this hypothesis shows that the Livin by Mandiri application already has a competent digital service quality, this can be seen from how their ability to protect user personal data in the application, the UI/UX design of the application is quite attractive and easy to use, and diverse and fast customer support in handling user problems. In addition, there is an emotional attachment that users have to the Livin by Mandiri application so that

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users choose the related application to meet their financial needs digitally. The aspect of digital service quality and emotional attachment that users have makes users interested in continuing to interact and use the Livin by Mandiri application product.

The Relationship Between Gamification and User Engagement

Based on the results of the analysis of the test*t-statistics*And*p-value,*it is known that both related values are within the insignificant range, where*t-statistics*has a value of 1.430 which is below the figure of 1.96 and*p-value*has a value of 0.076 which is above 0.05. The overall results of this assessment show that the fourth hypothesis which states that "The study found that the positive impact of gamification on user engagement was unacceptable. This finding aligns with other studies that suggest a relationship between the use of gamification features implemented in a product and the impact on user engagement.(Smirani & Yamani, 2024).

In the context of digital banking products, there is research that explains that the use of gamification features is less able to provide a significant impact on user behavior in using related banking products, which is suspected to be due to the absence of certain features such as reward points in the BCA application as a case study for related research.(Anugrah et al., 2021). Furthermore, there is another study that explains in detail that in research related to the use of gamification features by users of financial technology products, it is assessed that users can use gamification features well in the short term, but when used long-term, it is not certain that users will continue to use the related features.(Wardani & Herman, 2025).

The conclusion from the results of this hypothesis shows that the gamification feature in the Livin by Mandiri application may not have been implemented thoroughly where there are certain aspects in the related features that have not been presented by the developer such as rewards from Livin Points exchange that do not match the wishes of the majority of users or features that can encourage users to increase the number of Livin Points with other users. In addition, the duration of use of the feature also has an impact where the current gamification feature is still considered ineffective in maintaining users to continue using the related feature in the long term. Related matters influence the low desire of users to interact and use the gamification feature continuously.

The Relationship Between User Experience and User Engagement

Based on the results of the analysis of the test*t-statistics*And*p-value,*it is known that both related values are within a fairly significant range, where*t-statistics*has a value of 1.468 which is below the figure of 1.96 and*p-value*has a value of 0.071 which is above 0.05. The overall results of this assessment show that the first hypothesis which states that ""The positive impact of user experience on user engagement" was declared unacceptable. This is certainly inconsistent with previous studies that explain the relationship between the experience of using a banking product and the level of user engagement with the related application.(Rohman & Sutopo, 2024);(Glavee-Geo et al., 2019).

In another study that explains QRIS financial products, it was found that user experience did not have a significant impact even though it showed positive results on user interest in using related products so that QRIS users, even though they liked the functions

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offered due to the ease of payment presented, they still did not feel encouraged to continue using related features continuously. In another study that focused on case studies of Islamic financial technology products, user experience was found to have no significant influence on how users were interested in using a related Islamic financial product, where this shows how the dynamics of the behavior of using unique financial technology products where each type of product such as Islamic financial products can be assessed by users that the influence of benefits received from the performance of related products does not always help in increasing user engagement on related products directly.(Yuniati et al., 2024).

The conclusion of this hypothesis suggests that Livin by Mandiri app users may already be satisfied with the app's functionality, developed by the developer to provide digital-based financial services to users. However, users are deemed to have yet to see the benefits of improved user experience, which often only impacts app performance as a motivator that drives them to continue using the app.

Conclusion and Recommendation

This study demonstrates that user satisfaction plays a central mediating role in strengthening user engagement in the Livin by Mandiri application. The findings indicate that user experience and gamification significantly enhance user satisfaction, while user satisfaction itself has a strong and positive effect on user engagement. However, user experience and gamification do not directly influence user engagement, suggesting that functional quality and game-based features alone are insufficient to sustain long-term engagement without first generating psychological fulfillment and satisfaction. These results confirm that satisfaction acts as a key psychological mechanism that bridges the relationship between system design, motivational features, and sustained user interaction in digital banking services.

Despite its contributions, this study has several limitations. The research sample was limited to users in the Jabodetabek area and relied on self-reported questionnaire data, which may introduce response bias and limit the generalizability of the findings. In addition, the cross-sectional research design does not fully capture changes in user behavior over time, particularly regarding the long-term effects of gamification. Future research is encouraged to adopt longitudinal approaches, expand the geographical scope, and include additional variables such as trust, perceived security, or emotional attachment to enrich the explanatory power of the model. From a practical perspective, the findings imply that banks should prioritize strategies that enhance user satisfaction by integrating intuitive user experience design with meaningful and well-communicated gamification features. By focusing on satisfaction as a strategic lever, digital banking providers can foster stronger emotional connections and encourage sustainable user engagement in an increasingly competitive digital financial ecosystem.

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